irrigation, and he told me he felt and had a taste just as when he was gassed two years ago. And he was right, only instead of the Hun, I had given him the chlorine.

This little paper is deliberately superficial—its only object being to emphasize the importance (1) of disturbing these patients as little as possible, (2) of a very simple technique, (3) of the success of irrigation, even in old mixed infection cases, (4) of feeding as much as possible, (5) of getting them up as soon as the wounds are sealed, and (6) of not losing any patients.

THE PATHOGENESIS OF PACHYMENINGITIS DUE TO NASAL OPERATIONS, WITH REPORT OF CASES.*

By ANDREW B. WESSELS, M. D., San Diego.

That there are relatively infrequent deaths following intranasal operations is shown by a review of the literature. Considering the number of nasal operations done, one wonders why meningitis as a complication is so seldom reported by the surgeon. In reporting my own case and putting on record three other cases operated on by other surgeons, but which have not been reported, I do so with the idea of getting closer to the pathology of the ethmoid labyrinth. It seems to me not enough attention has been paid to radiography in sinus work. Many of the deaths reported in the literature might have been obviated had the surgeon had a radiograph before attempting intranasal instrumentation. The possibility of brain involvement resulting by continuity, though bones and dura mater are intact, has been demonstrated (Hajek). In operations on the middle turbinate, infection can readily spread by way of the porous, poorly resisting ethmoid labyrinth. Removing polypi may open up diseased periosteum and bone with possible extension into new areas for absorption into regions always dangerous. Similarly, operations intranasally on frontal sinus, the bone structure of which may be atrophied through extension, might infect the meninges. The transmission of microorganisms through the blood stream from the nasal cavities has been established (Hajek and Flexner). There is a direct relation between the perimeningeal lymph-spaces and the lymphatics and the nasal mucosa by way of the cribriform plate of the ethmoid. Downward prolongations of the subarachnoid space, which forms a net work around the olfactory filaments as they pass through, other prolongations also pass through quite independently of the olfactory nerves. By means of these prolongations direct communication exists between the subarachnoid space and the lymphatics of the upper portion of the nose (Andre). When the condition of the nose is considered, in disease of the sinuses, with the bones sclerotic, porous, or atrophic, is it a wonder that oftentimes the slightest instrumentation will result in meningeal involvement through fracture? Unfortunately, all deaths from meningitis following nasal operations do not go to autopsy, hence the location of most frequent perforation and fracture is not available.

In analyzing the available literature on intranasal operative deaths, from meningeal complication, it seems that the operations directly on the ethmoid labyrinth are responsible for the largest number, perhaps because it is most frequently operated upon. The radical external frontal sinus operation is not considered here, although intranasal frontal sinus instrumentation is responsible for quite a number of deaths, due to fracture of the inner wall of the sinus or extension through the bone or perforation through the cribriform when no frontal sinus exists. The apparently simple operation for the removal of portions of the middle turbinate appears to be responsible for a large number of deaths either by direct fracture through the ethmoid and cribriform plate or by extension of infection through blood stream and lymphatics. The submucous operation on the nasal septum, which ordinarily is simple and would appear not at all dangerous, is responsible for its quota of deaths, this by hematogenous and lymphogenous extension.

Any operation of the nose, no matter how slight it has been, may be fatal through complication, by producing a recrudesence of an old latent meningitis or a meningitis by infection through an old perforation or dehiscence in either the ethmoid labyrinth, cribriform plate, or internal wall of the frontal sinus. The infection, once it reaches the cranial cavity, whether through the cribriform or frontal sinus, is usually found in the frontal lobe in the basal portion or anterior or median region (Freundenthal).

I. The writer saw in consultation a patient who, as the result of a nasal operation, died of a meningitis. The anterior tip of the middle turbinate had been removed, the bones were sclerotic, and there was a large amount of pus in both the frontal and ethmoid sinuses. The patient went into shock immediately after the operation and died on the fourth day from a pneumococcic extension.

II. A skilled operator removed the middle turbinate, which was hypertrophied and causing an obstruction. It was followed by a severe hemorrhage, tamponage was resorted to to check the bleeding. The patient died on the fifth day from a meningeal involvement. Streptococci were found in the spinal fluid.

III. The third case of meningitis following the removal of the middle turbinate was in the office of a surgeon. Patient developed meningitis and died on the seventh day. There were no postmortems on these cases.

The supposition is that in these three cases, there was a fracture into the cribriform plate through the ethmoid labyrinth after simple operations on the middle turbinate. Apparently the patients were in good health prior to operation.

IV. A second cruise man of about thirty-two years of age was referred to me because he was "dopey." He seemed to be unable to hear commands given by his drill master, and was very slow in executing any order. He complained of moderate headaches extending over a period of

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years. On examination, the nose was found to be filled with polypi and it was almost impossible for him to breathe. With the idea of giving him breathing space, the polypi only were snared out. A radiograph taken previously showed right frontal sinus and both ethmoid labyrinths opaque. The idea was at a later date to clean out the ethmoid and drain the frontal sinus. Tamponage was not needed. On the fourth day, Dr. Little, neurologist of the Naval Training Camp, San Diego, saw the case and diagnosed a Pachymeningitis. The patient died on the sixth day.

Autopsy report by Dr. H. A. Thompson.

Autopsy made six hours after death. On opening skull, general softening of the bones was noted, in areas this was so marked that the scapel could cut through. The dura was adherent to bone and very much thickened and general diffuse Pachymeningitis was found. The blood vessels at the base showed general sclerosis. A rupture of the first branch of anterior cerebral artery on right side was present. There was a clot 2-5/10 cm. in diameter in center of the right frontal lobe, the tissue surrounding this involving practically the entire right frontal lobe, which was softened and necrotic. The right lateral ventricle was involved and showed a small clot. There was a small oblique fracture through the cribriform plate of the ethmoid on the right side, the bone was very thin and spongy, and the polypi could be discerned in the ethmoid labyrinth through the cribriform plate.

Cause of death. Pachymeningitis following fracture of skull. The condition of the bone existed prior to the operation and rendered the tissue much more susceptible to trauma. Blood Wassermann showed four (4) plus positive.

San Francisco Shows Lowest Infant Mortality

SAN FRANCISCO DEPARTMENT OF HEALTH.

The following statement prepared by Health Officer William C. Hassler on births for the fiscal year 1918-1919 and deaths of infants during the same period is presented as being worthy of particular mention owing to the interest that has been displayed within recent times concerning Baby Welfare.

Births registered.

1918	Males	Females	Totals
July	345	339	684
August	415	383	798
September	407	378	785
October	418	366	784
November	354	346	700
December	371	338	709
1919			
January	359	310	669
February	330	308	638
March	378	361	739
April	328	334	662
May	370	388	758
June	398	328	726
	4473	4179	8652

The above total is exclusive of 356 stillbirths divided as follows:

Males 211, females 145, an excess of 66 boys over girls.

In the living births the boys exceeded the girls by 264 or 3 per cent. of the total number registered.

The introductory table shows a total of 8652 births recorded—and of this number 725 were born of parents residing outside of San Francisco and this group should rightfully be excluded from the gross total, thus leaving a net total of 7927 to be credited to our city as the natural increment to the population.

The recordation of births as shown by the figures for the fiscal year 1918-19, indicates a marked advance over previous years, the increase over the last five years being from 10 to 15 per cent. Our birth rate per 1000 of population for the year ending June 30, 1919, based on a census of 500,000 inhabitants, gives us 17.3 as compared to the previous three years of 13.5 to 15 per cent. per 1000 (Note—the 10 to 15 per cent. increase first mentioned refers to increase in **number**—the rates per 1000 are calculated on **population percentage).**

It can therefore be safely asserted that San Francisco is at least 98 per cent. perfect insofar as birth registration is concerned.

Physicians—Register Your Births Promptly.

The gross total distributed by color or race of parents gives the following figures: White 8121, Black 38, Chinese 196, Japanese 297.

By nativities, parents registered as straight U. S. born 4320, or 50 per cent. of the entire total; Great Britain 126, Ireland 300, Germany 72, France 77, Italy 747, Scandinavia 157.

2279 births were registered under "mixed parentage" comprising unions representing every country on the globe—589 of these or 25 per cent. being "United States and other"—indicating either father or mother being born in this country. Exclusive of the last named total a tabulation was kept of parentage involving unions between the United States and prominent foreign countries, and these tables show: U. S.-Ireland, 167; U. S.-Germany, 159; U. S.-Italy, 248.

It is interesting to note that under straight Italian and U. S. -Italian parentage 995 births were recorded or 11½ per cent. of the entire total—and the Japanese run up to 297, being far in advance of many of the "straight-parentage" countries, thus with a population of 5000 (estimated) the Japanese standing alone shows a birth rate of 5 per cent. per 1000.

The U. S. census figures do not attempt to segregate the population by nativities, hence it is not possible to figure out the exact percentage of Italian births to their population, but their rate of 11½ per cent. of the entire birth registration gives a fair index as to the fecundity of this race.

Physicians—Report Communicable Diseases without Delay.

Mortality.

"Infant Mortality" as referred to by the U. S. Census Bureau deals with deaths of children up to the age of one year.

For the fiscal year ending June 30, 1919, San Francisco registered 697 deaths of children in this age period.

The total deaths (adults and children) from all causes totalled 10,852, but of this large number 3322 are charged as victims of the two invasions of influenza in October-November, 1918, January-February, 1919; deducting these from the grand total gives us 7530 deaths as the normal rate. Yet even this is a high figure and considerably above our usual total, as our normal pneumonia death rate was augmented by easily 40 per cent. during the influenza epidemic.

The percentage of deaths of infants to the nor-